BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-119488
(43)Date of publication of application : 23.04.2002

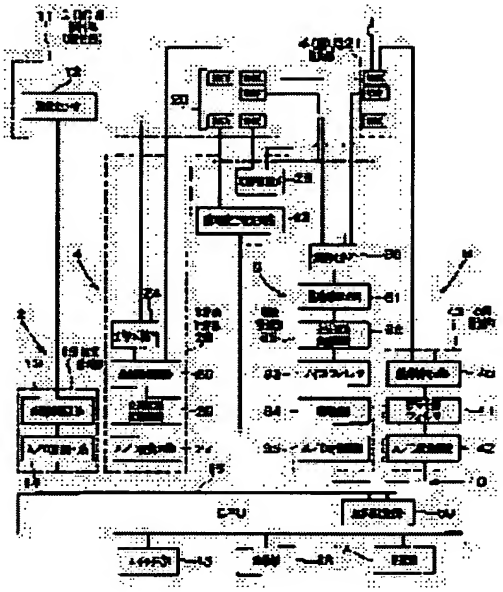
(51)Int.CI. A61B 5/0402
A61B 5/0205
A61B 5/0245
A61B 5/05

(21)Application number : 2000-314785
(22)Date of filing : 16.10.2000

(71)Applicant : TANITA CORP
(72)Inventor : SATO TOMIO

(54) COMPOSITE HEALTH MONITORING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a composite health monitoring apparatus using no large batteries for merchandizing the apparatus specifying a battery use and providing the measuring result hardly affected by an examees posture.
SOLUTION: This composite health monitoring apparatus is provided with a body fat measuring part, a pulse wave measuring part, and an electrocardiographic part, and the body fat measuring part, the pulse wave measuring part, and the electrocardiographic part are characterized in having electrodes to be connecting ports of the electric signals passing through the living body respectively.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2002－119488
（P2002－119488A）
(43)公開日　平成14年４月23日(2002.4.23)

(51)Int.Cl.'	識別記号	ＦＩ		テーマコード'(参考)
Ａ６１Ｂ	5/0402	Ａ６１Ｂ	5/05	Ｂ　４Ｃ０１７
	5/0205		5/04	３１０Ｍ　４Ｃ０２７
	5/0245		5/02	Ｂ
	5/05			３１０Ｚ

審査請求　未請求　請求項の数10　ＯＬ　（全６頁）

(21)出願番号　特願2000－314785(P2000－314785)

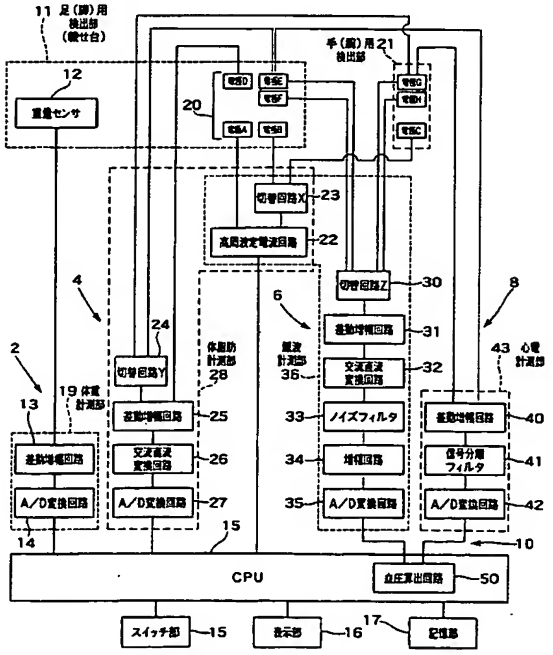
(22)出願日　平成12年10月16日(2000.10.16)

(71)出願人　000133179
株式会社タニタ
東京都板橋区前野町１丁目14番２号
(72)発明者　佐　藤　富　男
東京都板橋区前野町１丁目14番２号　株式会社タニタ内
(74)代理人　100064285
弁理士　佐藤　一雄　（外３名）

Ｆターム(参考)　4C017 AA08 AA09 AA18 AA19 AB02
AB10 AC16 BC01 BC07 BC11
CC01 FF05 FF17
4C027 AA00 AA02 AA06 DD05 EE01
EE03 EE05 FF01 FF02 KK00
KK03 KK05

(54)【発明の名称】　複合健康計測装置

(57)【要約】
【課題】　電池仕様の製品化に際して大きな電池を必要とせず、測定結果が測定姿勢に影響されにくい複合健康計測装置を提供する。
【解決手段】　体脂肪計測部と脈波計測部と心電計測部とを備えた複合健康計測装置であって、体脂肪計測部と脈波計測部と心電計測部の各々は、生体に流れる電気信号の連絡口となる電極を有することを特徴とする。



1

【特許請求の範囲】
【請求項１】体脂肪計測部と脈波計測部と心電計測部とを備えた複合健康計測装置であって、
前記体脂肪計測部と前記脈波計測部と前記心電計測部の各々は、生体に流れる電気信号の連絡口となる電極を有することを特徴とする複合健康計測装置。
【請求項２】さらに他の生体計測部を備え、前記他の生体計測部は、生体に流れる電気信号の連絡口となる電極を有することを特徴とする請求項１に記載の複合健康計測装置。
【請求項３】前記電極の少なくとも一部は、少なくとも一部の計測部において互いに共用されることを特徴とする請求項１または２のいずれか１項に記載の複合健康計測装置。
【請求項４】前記脈波計測部は、血管における脈波による血液の容積変化をインピーダンス変化として検出することを特徴とする請求項１乃至３のいずれか１項に記載の複合健康計測装置。
【請求項５】前記電極は、足を測定部位とする足用検出部と手を測定部位とする手用計測部とに配設されていることを特徴とする請求項１乃至４のいずれか１項に記載の複合健康計測装置。
【請求項６】前記足用検出部に配設された前記電極の少なくとも一部と前記手用計測部に配設された前記電極の少なくとも一部とを切り替え接続可能にする切替手段を備えることを特徴とする請求項５に記載の複合健康計測装置。
【請求項７】前記電極は全て、足を測定部位とする足用検出部に配設されていることを特徴とする請求項１乃至４のいずれか１項に記載の複合健康計測装置。
【請求項８】前記足用検出部は、体重計の載せ台に設けられていることを特徴とする請求項５、６、７のいずれか１項に記載の複合健康計測装置。
【請求項９】前記心電計測部は、他の計測部に起因する信号を分離除去するための信号分離フィルタを備えることを特徴とする請求項１乃至８のいずれか１項に記載の複合健康計測装置。
【請求項１０】血圧値を算出するための血圧算出手段を備え、前記血圧算出手段は、身長を脈波伝播時間で除して脈波伝播速度を求め、前記脈波伝播速度から所定式に従い血圧値を算出することを特徴とする請求項１乃至９のいずれか１項に記載の複合健康計測装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本願発明は、複合健康計測装置に係り、特に、体脂肪の計測部と脈波の計測と心電の計測を可能にする複合健康計測装置に関する。
【０００２】
【従来の技術】生活習慣病（成人病）を予防するために不可欠な血圧の測定と体脂肪の測定とは、通常、別々の

2

機器を用いて行われている。
【０００３】これに対し、血圧（心電、脈拍も含む）と体脂肪率とを一度に計測できるように複合された健康管理機器が開示されている（特開２０００－１０７１３８号公報）。この機器は両手で把手を握り計測するものであり、この把手には、心電を計測する心電電極と、身体の比抵抗（インピーダンス）を計測する体脂肪電極と、脈拍を計測する光学式脈拍センサとがそれぞれ設けられている。そして、心電と脈拍の伝搬時間差から血圧を算出し、把手を握るという簡単な動作で血圧と体脂肪率とを一度に計測できるというものである。
【０００４】
【発明が解決しようとする課題】しかしながら、上述の公報に記載された健康管理機器では、光学式脈拍センサが用いられており、光学式脈拍センサではその一部である発光素子を発光させるために必要な電力の消費を無視できず、電池仕様の製品化に際して大きな電池を必須的に備える必要があるという障害があった。
【０００５】また、光学式脈拍センサは、一般に外光からのノイズを受けやすいため、被計測者は、把手の握り方を注意し気を配りながら計測する必要があった。
【０００６】また、上述の健康管理機器では、脈拍の測定に対し検出位置と心臓位置との高さ関係が測定結果に影響し、また体脂肪率の測定に対しては計測距離が測定結果に影響するために、両手の上下位置や両手の伸ばし位置等の被計測者の計測姿勢の違いにより測定結果に影響が生じ得る。このため、脈拍や体脂肪率の測定が、被計測者が両手で把手を握るときの腕の姿勢の影響を受けやすい。このため、被計測者は、腕の姿勢を一定に保持するように注意し気を配りながら計測する必要があった。
【０００７】そこで、本発明の目的は、上記従来の問題を解消し、電池仕様の製品化に際して大きな電池を必要とせず、測定結果が測定姿勢に影響されにくい複合健康計測装置を提供することである。
【０００８】
【課題を解決するための手段】上記目的を達成するために、本発明の複合健康計測装置は、体脂肪計測部と脈波計測部と心電計測部とを備えた複合健康計測装置であって、前記体脂肪計測部と前記脈波計測部と前記心電計測部の各々は、生体に流れる電気信号の連絡口となる電極を有することを特徴とする。
【０００９】これによって、電極を使用して体脂肪や脈波や心電を計測するので、例えば光学式の計測手法によるものに比べて電力消費を少なくすることができ、また、電極に検出部位を気軽に接触させるだけでよいので、握り方などの計測状態に気を配る必要を無くすることができる。
【００１０】また、さらに他の生体計測部を備え、前記他の生体計測部は、生体に流れる電気信号の連絡口とな

る電極を有することを特徴とする。

【００１１】これによって、体脂肪の計測や脈波の計測や心電の計測だけでなく、他の生体計測が可能な、電力消費が少なく計測状態に気を配る必要がない複合健康計測装置を提供することができる。

【００１２】また、前記電極の少なくとも一部は、少なくとも一部の計測部において互いに共用されることを特徴とする。

【００１３】これによって、電力消費が少なく計測状態に気を配る必要がない複合健康計測装置のコストダウンを図ることができる。

【００１４】また、前記脈波計測部は、血管における脈波による血液の容積変化をインピーダンス変化として検出することを特徴とする。

【００１５】これによって、電極を介してインピーダンスを計測する方式であるため、電力消費を少なくすることができる。

【００１６】また、前記電極は、足を測定部位とする足用検出部と手を測定部位とする手用計測部とに配設されていることを特徴とする。

【００１７】これによって、計測部として足や脚を活用し、例えば立った姿勢等の自然体の計測姿勢で計測することが可能になり、被計測者は、腕の姿勢を一定に保持するように注意し気を配りながら計測する必要を無くすることができる。

【００１８】また、前記足用検出部に配設された前記電極の少なくとも一部と前記手用計測部に配設された前記電極の少なくとも一部とを切り替え接続可能にする切替手段を備えることを特徴とする。

【００１９】これによって、複数の計測個所から適宜好ましい計測個所を選択する事ができる。

【００２０】また、前記電極は全て、足を測定部位とする足用検出部に配設されていることを特徴とする。

【００２１】これによって、計測部として足や脚を活用し、例えば立った姿勢等の自然体の計測姿勢で計測することが可能になり、被計測者は、腕の姿勢を一定に保持するように注意し気を配りながら計測する必要を無くすることができる。

【００２２】また、前記足用検出部は、体重計の載せ台に設けられていることを特徴とする。

【００２３】これによって、体脂肪率を求める場合に通常必要とされる体重データの入力手続を不要にすることができる。

【００２４】また、前記心電計測部は、他の計測部に起因する信号を分離除去するための信号分離フィルタを備えることを特徴とする。

【００２５】これによって、計測精度の高い複合健康計測装置を提供することができる。

【００２６】また、血圧値を算出するための血圧算出手段を備え、前記血圧算出手段は、身長を脈波伝播時間で除して脈波伝播速度を求め、前記脈波伝播速度から所定式に従い血圧値を算出することを特徴とする。

【００２７】これによって、血圧を算出する上で必要な身体の距離情報として体脂肪率の算出に必要な身長のデータを用いるので、血圧を算出する上で必要なデータの入力手続を減らすことができる。

【００２８】

【発明の実施の形態】以下に図面を参照して、本発明に係る複合健康計測装置の実施の形態について説明する。

【００２９】図１は本実施の形態に係る複合健康計測装置の構成を示すブロック図である。複合健康計測装置は、体重計２、体脂肪計４、脈波計６、心電計８、及び血圧計１０を組み合わせた複合機器として構成されている。

【００３０】体重計２は、載せ台１１から荷重の伝達を受けて電気信号化する重量センサ１２と、重量センサ１２からの信号を増幅する差動増幅回路１３と、差動増幅回路１３からのアナログ信号をデジタル信号に変換するＡ／Ｄ変換回路１４と、種々の信号の演算処理するＣＰＵ１５と、測定モードや測定結果を表示する表示部１６と、測定値や個人情報を記憶する記憶部１７と、測定モードの切り換えや個人情報の入力を行うためのスイッチ部１８とから構成されている。ここで、体重計２の計測処理部として機能する体重計測部１９は、差動増幅回路１３とＡ／Ｄ変換回路１４とによって構成されている。

【００３１】体脂肪計４は、２個の通電用電極と２個の計測用電極とからなる４個の電極を用いる４電極法を適用して次のように構成されている。４個の電極を配設する位置として、４個の電極を全て足用検出部２０に設ける場合と、２個の電極を足用検出部２０に設け他の２個の電極を手用検出部２１に設ける場合とが可能である。ここで、足用検出部２０は載せ台１１の表面部に設けられており、手用検出部２１は載せ台１１に垂直に立設された図示しないポールの把手に付設されている。なお、手用検出部２１は載せ台１１と分離する把手に付設されたタイプでもよい。

【００３２】まず、全身のインピーダンスを両足間または両脚間（以後、足または脚を足という）で計測する場合の体脂肪計４においては、４個の電極の全てが足用検出部２０に配設されており、体脂肪計４は生体の両足間に電流路を形成する一対の通電用電極Ａ，Ｂと生体の両足間に生じる電位差を検出する計測用電極Ｄ，Ｅとを備えている。

【００３３】また、全身のインピーダンスを片足と片手または片腕（以後、手または腕を手という）の間から計測する場合の体脂肪計４においては、２個の電極が足用検出部２０に配設されて他の２個の電極が手用検出部２１に配設され、体脂肪計４は生体の片足と片手の間に電流路を形成する一対の通電用電極Ａ，Ｃと、生体の片足と片手の間に生じる電位差を検出する計測用電極Ｄ，Ｇ

とを備えている。

【００３４】そして具体的には、体脂肪計４は、通電用電極Ａ，Ｂ，Ｃに電流を供給する高周波定電流回路２２と、両足間もしくは片足と片手間の計測のために通電用電極ＢとＣの切替をする切替回路Ｘ２３と、両足間もしくは片足と片手間の計測のために計測用電極ＥとＧの切替をする切替回路Ｙ２４と、計測用電極Ｄ，Ｅ，Ｇからの信号を増幅する差動増幅回路２５と、差動増幅回路２５からの交流信号を直流信号に変換する交流直流変換回路２６と、交流直流変換回路２６からのアナログ信号をデジタル信号に変換するＡ／Ｄ変換回路２７と、ＣＰＵ１５と、表示部１６と、記憶部１７と、スイッチ部１８とを備えている。

【００３５】ここで、体脂肪計４の計測処理部として機能する体脂肪計測部２８は、切替回路Ｘ２３、高周波定電流回路２２、切替回路Ｙ２４、差動増幅回路２５、交流直流変換回路２６、Ａ／Ｄ変換回路２７の処理部分によって構成されている。

【００３６】次に、脈波計６について説明する。脈波計６は、身体の抹消部位の脈動による血液の水分変動をインピーダンス変化として測定する。脈波計６としては、測定部位を足または脚（以下に、足または脚を足とする）に測定部位を設定する場合と手に設定する場合とが可能である。

【００３７】足に測定部位を設定する場合の脈波計６は、生体の両足間に電流路を形成する一対の通電用電極Ａ、Ｂと、生体の足部位に生じる電位差を検出する計測用電極Ｅ，Ｆとを足用検出部２０に備えている。

【００３８】また、手に測定部位を設定する場合の脈波計６は、生体の片足と片手間に電流路を形成する一対の通電用電極Ａ，Ｃと、生体の手部位に生じる電位差を検出する計測用電極Ｇ，Ｈとを足用検出部２０と手用検出部２１に備えている。

【００３９】そして、具体的には脈波計６は、通電用電極Ａ，Ｂ，Ｃに電流を供給する高周波定電流回路２２と、足もしくは手による計測のために通電用電極ＢとＣとの切替をする切替回路Ｘ２３と、足もしくは手による計測のために計測用電極Ｅ，ＦとＧ，Ｈの切替をする切替回路Ｚ３０と、計測用電極Ｅ，ＦもしくはＧ，Ｈからの信号を増幅する差動増幅回路３１と、差動増幅回路３１からの交流信号を直流信号に変換する交流直流変換回路３２と、交流直流変換回路３２からの信号のノイズ成分を取り除くノイズフィルタ３３と、信号を増幅する増幅回路３４と、増幅回路３４からのアナログ信号をデジタル信号に変換するＡ／Ｄ変換回路３５と、ＣＰＵ１５と、表示部１６と、記憶部１７と、スイッチ部１８とを備えている。

【００４０】ここで、脈波計６の計測処理部として機能する脈波計測部３６は、切替回路Ｘ２３、高周波定電流回路２２、切替回路Ｚ３０、差動増幅回路３１、交流直流変換回路３２、ノイズフィルタ３３、増幅回路３４、Ａ／Ｄ変換回路３５とによって構成されている。なお、上記のノイズフィルタ３３の部分は、微分回路であっても可能である。

【００４１】次に、心電計８について説明する。心電計８は、心臓が鼓動するときに生じる電位差(心電波)を検出する一対の計測用電極Ｅ、Ｇと、計測用電極Ｅ、Ｇからの信号を増幅する差動増幅回路４０と、体脂肪や脈波の計測により伴なう高周波成分が重畳された信号を取り除くための信号分離フィルタ４１と、信号分離フィルタ４１により取り除かれた心電成分のみのアナログ信号をデジタル信号に変換するＡ／Ｄ変換回路４２と、ＣＰＵ１５と、表示部１６と、記憶部１７と、スイッチ部１８とを備えている。

【００４２】ここで、心電計８の計測処理部として機能する心電計測部４３は、差動増幅回路４０、信号分離フィルタ４１、Ａ／Ｄ変換回路４２とによって処理部分である心電計測部４３で構成されている。

【００４３】次に、血圧計１０について説明する。血圧計１０においては、心臓の鼓動に伴い心電計８によって心電波（Ｒ波）が検出される検出時間から脈波計６によって脈波の立ち上がりが検出される検出時間に至るまでの時間差、すなわち脈波伝播時間（ＰＷＴＴ：pulse Wave TransitTime）が算出され、被計測者の身長をこの算出した脈波伝播時間で除して脈波伝播速度（ＰＷＶ：Pulse Wave Velocity）が求められる。心電波は、心臓の鼓動に対してほとんど時間差を生じないので、上述の方式により脈波伝播速度ＰＷＶを求めることが可能である。血圧計１０は、脈波伝播速度ＰＷＶは血圧に比例するという医学的見解に基づき、求めた脈波伝播速度ＰＷＶからＣＰＵ１５内の血圧算出手段５０によって、血圧値を算出する。

【００４４】なお、通電用電極Ａ、Ｂ、Ｃは、体脂肪計４及び脈波計６によって共用されるものであり、また、計測用電極Ｅ、Ｇは体脂肪計４、脈波計６及び心電計８によって共用されるものである。さらに、体重計２、体脂肪計４、脈波計６及び心電計８におけるＣＰＵ１５、表示部１６、記憶部１７及びスイッチ部１８は、共用されるものである。

【００４５】また、体脂肪や脈波や心電を電極を用いて測定する生体計測部の他に、電極により生体を計測するための他の生体計測部をさらに備えることも可能である。この場合、通電用電極Ａ、Ｂ、Ｃや計測用電極Ｅ、Ｇは、適宜、共用することが可能である。

【００４６】次に、上述の複合健康計測装置の使用方法や装置の動作について説明する。まず、被計測者は、スイッチ部１８を介して、体脂肪率を算出するための個人条件（身長、男女の別など）、血圧を算出するための個人条件（身長）を入力する。このとき、入力された個人条件は記憶部１７に記憶され、各計測部２，４，６，

８、１０は計測可能な状態となる。

【００４７】電極が載せ台１１の表面部の足用検出部２０とポールの把手に付設された手用検出部２１に配設されている場合には、被計測者は、足の裏が足用検出部２０の電極に接触するように載せ台１１上に載り、手のひらや指が手用検出部２１の電極に接触するようにグリップを握り、計測を行う。また、全ての電極が載せ台１１の足用検出部２０に配設されている場合には、被計測者は、足の裏が足用検出部２０の電極に接触するように載せ台１１上に載り、計測を行えばよい。

【００４８】体重計測部１９は重量センサ１２で検出された計測信号を処理し、体脂肪計測部２８、脈波計測部３６、及び心電計測部４３の各々は各電極からそれぞれ検出された計測信号を処理する。このとき、各計測信号の検出や各計測部の処理は同時に行われる。

【００４９】切替回路Ｘ２３が通電用電極Ｂと接続するように切り替えられている場合には、高周波電流は被計測者の一方の足から股を経由して他方の足へと流れる。そしてこのとき、切替回路Ｙ２４は計測用電極Ｅと接続するように切り替えられており、切替回路Ｚは計測用電極Ｅ、Ｆと接続されるように切り替えられている。

【００５０】また、切替回路Ｘ２３が通電用電極Ｃと接続するように切り替えられている場合には、高周波定電流は被計測者の胴体を経由して片方の足（片方の手）から胴体を経由して片方の手（片方の足）へと流れる。そしてこのとき、切替回路Ｙは計測用電極Ｇと接続するように切り替えられており、切替回路Ｚは計測用電極Ｇ、Ｈと接続されるように切り替えられている。

【００５１】心電計測部４３は、心電用電極Ｅ、Ｇを体脂肪用電極や脈波用電極と共有することから体脂肪計測部２８や脈波計測部３６との間に信号経路が形成され得る。そして、心電計測を体脂肪計測や脈波計測と同時に行うために、体脂肪計測や脈波計測に起因する高周波成分が心電計測の信号成分に重畳されて計測される。そこで、心電の計測では、信号分離フィルタ４１により体脂肪計測や脈波計測における高周波成分を取り除き心電波の成分のみを分離することが行われる。

【００５２】血圧計１０の血圧算出手段５０では、心電計測部４３による心電波（Ｒ波）の検出時間から脈波計測部３６による脈波の立ち上がりの検出時間を減ずることにより、脈波伝播時間ＰＷＴＴを算出し、スイッチ部１８により個人条件として入力され記憶部１７に記憶されている身長値を算出した脈波伝播時間ＰＷＴＴで除して、血圧に比例する脈波伝播速度ＰＷＶを算出し、算出した脈波伝播速度ＰＷＶから所定の式に基づき血圧値に換算し、血圧値が算出される。

【００５３】ここで、血圧値に比例する脈波伝播速度ＰＷＶを求めるために、脈波伝播時間ＰＷＴＴをスイッチ部１８により個人条件として入力された身長値で除する点が特徴的であり、体脂肪率を求める場合に通常必須となる個人条件としての身長値を用いることにより、脈波伝播時間ＰＷＴＴを除する値を別途入力する手間が脈波伝播速度ＰＷＶを算出するためには不要とすることができる。

【００５４】

【発明の効果】以上説明したように、本発明の構成によれば、電池仕様の製品化に際して大きな電池を必要とせず、測定結果が測定姿勢に影響されにくい複合健康計測装置を提供することができる。

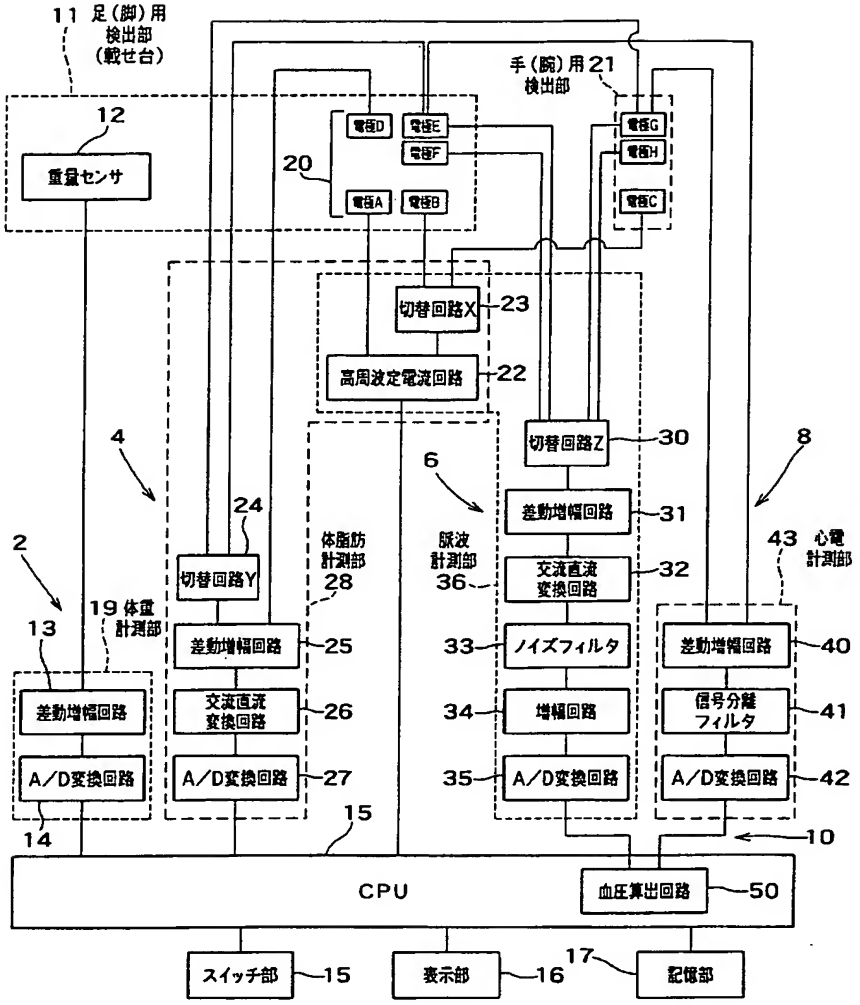
【図面の簡単な説明】

【図１】本発明に係る複合健康計測装置の一実施形態を示すブロック図。

【符号の説明】

２０　足用検出部
２１　手用検出部
２８　体脂肪計測部
３６　脈波計測部
４３　心電計測部
Ａ、Ｂ、Ｃ、Ｄ、Ｅ、Ｆ、Ｇ、Ｈ　電極

【図１】


11 足(脚)用検出部(載せ台)
12
重量センサ
20
電極D
電極E
電極F
電極A
電極B
手(腕)用 21 検出部
電極G
電極H
電極C
切替回路X 23
高周波定電流回路 22
4
6
8
切替回路Z 30
差動増幅回路 31
交流直流変換回路 32
24
切替回路Y
体脂肪計測部 28
脳波計測部 36
心電計測部 43
2
19 体重計測部
13
差動増幅回路 25
交流直流変換回路 26
A/D変換回路 27
33 ノイズフィルタ
34 増幅回路
35 A/D変換回路
差動増幅回路 40
信号分離フィルタ 41
A/D変換回路 42
14
15
10
CPU
血圧算出回路 50
スイッチ部 15
表示部 16
17
記憶部

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] The invention in this application relates to a compound healthy metering device, and relates to the compound healthy metering device which enables the measurement section of body fat, measurement of a pulse wave, and measurement of electrocardio especially.
[0002]
[Description of the Prior Art] Measurement of blood pressure and measurement of body fat indispensable in order to prevent a lifestyle-related disease (adult disease) are usually performed using the separate device.
[0003] On the other hand, the health-care device compounded so that blood pressure (electrocardio and a pulse are also included) and a body fat percentage could be measured at once is indicated (JP,2000-107138,A). This device carries out grip measurement of the handle with both hands, and the electrocardio electrode which measures electrocardio, the body fat electrode which measures the specific resistance (impedance) of the body, and the optical pulse sensor which measures a pulse are formed in this handle, respectively. And blood pressure and a body fat percentage are measurable at once in easy actuation of computing blood pressure from the travelling period difference of electrocardio and a pulse, and grasping a handle.
[0004]
[Problem(s) to be Solved by the Invention] However, by the health-care device indicated by the above-mentioned official report, the optical pulse sensor was used, by the optical pulse sensor, consumption of power required in order to make the light emitting device which is the part emit light could not be disregarded, but there was a failure that it was necessary to have a big cell in indispensable on the occasion of commercial production of a cell specification.
[0005] Moreover, since an optical pulse sensor generally tends to have received the noise from outdoor daylight, the measured person needed to measure, it having been careful of how grasping a handle, and distributing mind.
[0006] Moreover, by the above-mentioned health-care device, since the height relation between a pair necropsy appearance location and a heart location influences measurement of a pulse at a measurement result and measurement distance influences a measurement result to measurement of a body fat percentage, effect may arise in a measurement result by the difference in the measurement position of measured persons, such as a vertical location of both hands, and a stretch location of both hands. For this reason, measurement of a pulse or a body fat percentage tends to be influenced of the position of an arm in case a measured person grasps a handle with both hands. For this reason, the measured person needed to measure, having warned to hold the position of an arm uniformly and distributing mind.
[0007] Then, the object of this invention solves the above-mentioned conventional problem, and does not need a big cell on the occasion of commercial production of a cell specification, but is offering the compound healthy metering device with which a measurement result's cannot be easily influenced by the measurement position.

[0008]
[Means for Solving the Problem] In order to attain the above-mentioned object, the compound healthy metering device of this invention is a compound healthy metering device equipped with the body fat measurement section, the pulse wave measurement section, and the electrocardio measurement section, and each of said body fat measurement section, said pulse wave measurement section, and said electrocardio measurement section is characterized by having an electrode used as communication opening of an electrical signal which flows to a living body.
[0009] Since body fat, a pulse wave, and electrocardio are measured by this using an electrode, the need of taking care of the measurement conditions of being able to lessen power consumption compared with what is depended, for example on the optical measurement technique, and contacting at least a detecting element to an electrode freely, such as how being sufficient and grasping, can be abolished.
[0010] Furthermore, it has other somatometry sections and the somatometry section besides the above is characterized by having an electrode used as communication opening of an electrical signal which flows to a living body.
[0011] By this, the compound healthy metering device in which measurement of body fat, measurement of a pulse wave, or not only measurement of electrocardio but other somatometry are possible and with which power consumption does not need to take care of a measurement condition few can be offered.
[0012] Moreover, said some of electrodes [at least] are characterized by being mutually used in common in a part of [at least] measurement sections.
[0013] By this, power consumption can aim at the cost cut of a compound healthy metering device which does not need to take care of a measurement condition few.
[0014] Moreover, said pulse wave measurement section is characterized by detecting volume change of the blood by the pulse wave in a blood vessel as impedance change.
[0015] Since it is the method which measures an impedance through an electrode by this, power consumption can be lessened.
[0016] Moreover, said electrode is characterized by being arranged in the measurement section for hands it is supposed that it is at least as a test section about the detecting element for guide pegs and hand it is supposed that it is at least as a test section about a guide peg.
[0017] It becomes possible to measure with the measurement position of natural posture, such as a position which utilized the guide peg and the foot as the measurement section, for example, stood by this, and a measured person can abolish the need of measuring warning to hold the position of an arm uniformly and distributing mind.
[0018] Moreover, it is characterized by having the change means whose connection changes said some of electrodes [at least] arranged by said detecting element for guide pegs, and said some of electrodes [at least] arranged in said measurement section for hands, and is enabled.
[0019] By this, a desirable measurement part can be suitably chosen from two or more measurement parts.
[0020] Moreover, it is characterized by said all electrodes being arranged by the detecting element for guide pegs it is supposed that it is at least as a test section about a guide peg.
[0021] It becomes possible to measure with the measurement position of natural posture, such as a position which utilized the guide peg and the foot as the measurement section, for example, stood by this, and a measured person can abolish the need of measuring warning to hold the position of an arm uniformly and distributing mind.
[0022] Moreover, said detecting element for guide pegs is characterized by for the scale carrying and being prepared in the base.
[0023] By this, when asking for a body fat percentage, the weight entry-of-data procedure usually needed can be made unnecessary.
[0024] Moreover, said electrocardio measurement section is characterized by having a signal separation filter for carrying out separation clearance of the signal resulting from other measurement sections.
[0025] By this, the high compound healthy metering device of measurement precision can be offered.
[0026] Moreover, it has a blood-pressure calculation means for computing a blood-pressure value, said

blood-pressure calculation means ** height by the pulse wave propagation time, and it asks for pulse wave velocity, and is characterized by computing a blood-pressure value according to a predetermined type from said pulse wave velocity.
[0027] Since the data of height required for calculation of a body fat percentage as distance information on the required body when computing blood pressure are used by this, when computing blood pressure, a required entry-of-data procedure can be reduced.
[0028]
[Embodiment of the Invention] With reference to a drawing, the gestalt of operation of the compound healthy metering device concerning this invention is explained below.
[0029] Drawing 1 is the block diagram showing the configuration of the compound healthy metering device concerning the gestalt of this operation. The compound healthy metering device is constituted as a compound device which combined the scale 2, body fat a total of four plethysmographs 6, the electrocardiograph 8, and the sphygmomanometer 10.
[0030] The weight sensor 12 which carries the scale 2 and is electrical-signal-ized in response to transfer of a load from a base 11, The differential amplifying circuit 13 which amplifies the signal from the weight sensor 12, and the A/D-conversion circuit 14 which changes the analog signal from a differential amplifying circuit 13 into a digital signal, It consists of CPU15 in which various signals carry out data processing, a display 16 which displays measurement mode and a measurement result, the storage section 17 which memorizes measured value and individual humanity news, and the switch section 18 for performing a switch in measurement mode, and the input of individual humanity news. Here, the weight measurement section 19 which functions as the measurement processing section of the scale 2 is constituted by the differential amplifying circuit 13 and the A/D-conversion circuit 14.
[0031] Body fat 4 [a total of] is constituted as follows with the application of four electrode methods using four electrodes which consist of two electrodes for energization, and two electrodes for measurement. As a location which arranges four electrodes, the case where all of four electrodes are prepared in the detecting element 20 for guide pegs, and the case where prepare two electrodes in the detecting element 20 for guide pegs, and other two electrodes are prepared in the detecting element 21 for hands are possible. Here, the detecting element 20 for guide pegs is carried, it is prepared in the surface section of a base 11, and the detecting element 21 for hands is attached to the handle of the pole which carried and was set up at right angles to a base 11 and which is not illustrated. In addition, the type attached to the handle which is carried and is separated with a base 11 is sufficient as the detecting element 21 for hands.
[0032] First, it sets to body fat 4 [a total of] in the case of measuring the impedance of the whole body among both guide pegs or between bipeds (a guide peg or a foot being henceforth called guide peg). All the four electrodes are arranged by the detecting element 20 for guide pegs, and a total of four is equipped with the electrodes A and B for energization of the couple which forms a current path among both a body fat living body's guide pegs, and the electrodes D and E for measurement which detect the potential difference produced among both a living body's guide pegs.
[0033] Moreover, it sets to body fat 4 [a total of] in the case of measuring the impedance of the whole body from between one leg, one hand, or right-hand man (a hand or an arm being henceforth called hand). Two electrodes were arranged by the detecting element 20 for guide pegs, other two electrodes were arranged by the detecting element 21 for hands, and a total of four is equipped with the electrodes A and C for energization of the couple which forms a current path between a body fat living body's one leg and one hand, and the electrodes D and G for measurement which detect the potential difference produced between a living body's one leg and one hand.
[0034] And the RF current regulator circuit 22 where body fat 4 [a total of] specifically supplies a current to the electrodes A, B, and C for energization, The electronic switch X23 which changes the electrodes B and C for energization between both guide pegs or to one leg for side measurement, The electronic switch Y24 which changes the electrodes E and G for measurement between both guide pegs or to one leg for side measurement, The differential amplifying circuit 25 which amplifies the signal from the electrodes D, E, and G for measurement, and the alternating current direct-current conversion

circuit 26 which changes the AC signal from a differential amplifying circuit 25 into a direct current signal, It has the A/D-conversion circuit 27 which changes the analog signal from the alternating current direct-current conversion circuit 26 into a digital signal, CPU15, a display 16, the storage section 17, and the switch section 18.

[0035] Here, the body fat measurement section 28 which functions as the measurement processing section of body fat 4 [a total of] is constituted by the processing parts of an electronic switch X23, the RF current regulator circuit 22, an electronic switch Y24, a differential amplifying circuit 25, the alternating current direct-current conversion circuit 26, and the A/D-conversion circuit 27.

[0036] Next, plethysmograph 6 is explained. Plethysmograph 6 measures moisture fluctuation of the blood by pulsation of the deletion part of the body as impedance change. The case where at least a test section is set as the case where at least a test section is set as a guide peg or a foot (let a guide peg or a foot be a guide peg below), and a hand, as plethysmograph 6 is possible.

[0037] The plethysmograph 6 in the case of setting at least a test section as a guide peg equips the detecting element 20 for guide pegs with the electrodes A and B for energization of the couple which forms a current path among both a living body's guide pegs, and the electrodes E and F for measurement which detect the potential difference produced at least in a living body's foot.

[0038] Moreover, the plethysmograph 6 in the case of setting at least a test section as a hand equips the detecting element 20 for guide pegs, and the detecting element 21 for hands with a living body's one leg, the electrodes A and C for energization of the couple which forms a current path in spare time, and the electrodes G and H for measurement that detect the potential difference produced at least in a living body's hand part.

[0039] And the RF current regulator circuit 22 where plethysmograph 6 specifically supplies a current to the electrodes A, B, and C for energization, The electronic switch X23 which carries out the change to the electrodes B and C for energization for measurement by the guide peg or the hand, The electronic switch Z30 which carries out the change of the electrodes E, F, and G for measurement, and H for measurement by the guide peg or the hand, The differential amplifying circuit 31 which amplifies the electrodes E and F for measurement, or the signal from G and H, The alternating current direct-current conversion circuit 32 which changes the AC signal from a differential amplifying circuit 31 into a direct current signal, The noise filter 33 which removes the noise component of the signal from the alternating current direct-current conversion circuit 32, It has the amplifying circuit 34 which amplifies a signal, the A/D-conversion circuit 35 which changes the analog signal from an amplifying circuit 34 into a digital signal, CPU15, a display 16, the storage section 17, and the switch section 18.

[0040] Here, the pulse wave measurement section 36 which functions as the measurement processing section of plethysmograph 6 is constituted by an electronic switch X23, the RF current regulator circuit 22, an electronic switch Z30, a differential amplifying circuit 31, the alternating current direct-current conversion circuit 32, the noise filter 33, the amplifying circuit 34, and the A/D-conversion circuit 35. In addition, even if the part of the above-mentioned noise filter 33 is a differential circuit, it is possible.

[0041] Next, an electrocardiograph 8 is explained. The electrodes E and G for measurement of the couple which detects the potential difference (electrocardio wave) which produces an electrocardiograph 8 when the heart beats, The signal separation filter 41 for removing the signal with which it was superimposed on the differential amplifying circuit 40 which amplifies the signal from the electrodes E and G for measurement, and the high frequency component by which it is accompanied by measurement of body fat or a pulse wave, It has the A/D-conversion circuit 42 which changes into a digital signal the analog signal of only the electrocardio component removed with the signal separation filter 41, CPU15, a display 16, the storage section 17, and the switch section 18.

[0042] Here, the electrocardio measurement section 43 which functions as the measurement processing section of an electrocardiograph 8 is constituted from the electrocardio measurement section 43 which is a processing part by the differential amplifying circuit 40, the signal separation filter 41, and the A/D-conversion circuit 42.

[0043] Next, a sphygmomanometer 10 is explained. In a sphygmomanometer 10, it is computed, time difference (PWTT:pulse Wave TransitTime), i.e., the pulse wave propagation time, until it results [from

the detection time by which an electrocardio wave (R wave) is detected by the electrocardiograph 8 with the beat of the heart] in the detection time by which the standup of a pulse wave is detected by plethysmograph 6, height of a measured person is **(ed) by this computed pulse wave propagation time, and pulse wave velocity (PWV:Pulse Wave Velocity) is called for. Since an electrocardio wave hardly produces time difference to the beat of the heart, it can be asked for pulse wave velocity PWV with an above-mentioned method. A sphygmomanometer 10 computes a blood-pressure value with the blood-pressure calculation means 50 in CPU15 from the pulse wave velocity PWV for which it asked based on the medical judgment that pulse wave velocity PWV is proportional to blood pressure.

[0044] In addition, the electrodes A, B, and C for energization are shared by body fat 4 [a total of] and plethysmograph 6, and the electrodes E and G for measurement are shared by body fat a total of four plethysmographs 6 and, and the electrocardiograph 8. Furthermore, CPU15 in the scale 2, body fat a total of four plethysmographs 6 and, and an electrocardiograph 8, a display 16, the storage section 17, and the switch section 18 are shared.

[0045] Moreover, it is also possible to have further other somatometry sections for measuring a living body with the electrode other than the somatometry section which measures body fat, a pulse wave, and electrocardio using an electrode. In this case, the electrodes A, B, and C for energization and the electrodes E and G for measurement can be used in common suitably.

[0046] Next, the operation of an above-mentioned compound healthy metering device and actuation of equipment are explained. First, a measured person inputs the individual conditions (height) for computing the individual conditions (exception of height and man and woman etc.) for computing a body fat percentage, and blood pressure through the switch section 18. At this time, the inputted individual conditions are memorized by the storage section 17, and each measurement sections 2, 4, 6, 8, and 10 will be in a measurable condition.

[0047] An electrode carries, and a measured person carries so that the flesh side of a guide peg may contact the electrode of the detecting element 20 for guide pegs, he appears on a base 11, and when arranged by the detecting element 20 for guide pegs of the surface section of a base 11, and the detecting element 21 for hands attached to the handle of the pole, he grips a grip and measurement so that a palm and a finger may contact the electrode of the detecting element 21 for hands. Moreover, when all electrodes carry and it is arranged by the detecting element 20 for guide pegs of a base 11, a measured person should just measure by carrying so that the flesh side of a guide peg may contact the electrode of the detecting element 20 for guide pegs, and appearing on a base 11.

[0048] The weight measurement section 19 processes the measurement signal detected by the weight sensor 12, and each of the body fat measurement section 28, the pulse wave measurement section 36, and the electrocardio measurement section 43 processes the measurement signal detected from each electrode, respectively. At this time, detection of each measurement signal and processing of each measurement section are performed simultaneously.

[0049] When changing so that an electronic switch X23 may connect with the electrode B for energization, the high frequency current flows from one guide peg of a measured person to the guide peg of another side via a crotch. And at this time, the electronic switch Y24 is changed so that it may connect with the electrode E for measurement, and the electronic switch Z is changed so that it may connect with the electrodes E and F for measurement.

[0050] Moreover, when changing so that an electronic switch X23 may connect with the electrode C for energization, RF constant current flows via a fuselage via the fuselage of a measured person to hand (guide peg of one of the two) of one of the two from guide peg (hand of one of the two) of one of the two. And at this time, the electronic switch Y is changed so that it may connect with the electrode G for measurement, and the electronic switch Z is changed so that it may connect with the electrodes G and H for measurement.

[0051] Since the electrocardio measurement section 43 shares electrodes for ECG E and G with the electrode for body fat, or the electrode for pulse waves, a signal path may be formed between the body fat measurement section 28 or the pulse wave measurement section 36. And in order to perform electrocardio measurement to body fat measurement, pulse wave measurement, and coincidence, the

high frequency component resulting from body fat measurement or pulse wave measurement is superimposed and measured by the signal component of electrocardio measurement. So, in measurement of electrocardio, removing the high frequency component in body fat measurement or pulse wave measurement with the signal separation filter 41, and separating only the component of an electrocardio wave is performed.

[0052] With the blood-pressure calculation means 50 of a sphygmomanometer 10, by reducing the detection time of the standup of the pulse wave by the pulse wave measurement section 36 from the detection time of the electrocardio wave (R wave) by the electrocardio measurement section 43 It ** by the pulse wave propagation time PWTT which computed the pulse wave propagation time PWTT and computed the height value which is inputted by the switch section 18 as individual conditions, and is memorized by the storage section 17. The pulse wave velocity PWV proportional to blood pressure is computed, based on a predetermined formula, it converts into a blood-pressure value from the computed pulse wave velocity PWV, and a blood-pressure value is computed.

[0053] The point of **(ing) the pulse wave propagation time PWTT with the height value into which it was inputted by the switch section 18 as individual conditions in order to ask for the pulse wave velocity PWV proportional to a blood-pressure value here is characteristic, and when asking for a body fat percentage, in order for the time and effort which inputs separately the value which ** the pulse wave propagation time PWTT by using the height value as individual conditions which become usually indispensable to compute pulse wave velocity PWV, suppose that it is unnecessary.

[0054]

[Effect of the Invention] As explained above, according to the configuration of this invention, a big cell is not needed on the occasion of commercial production of a cell specification, but the compound healthy metering device with which a measurement result cannot be easily influenced by the measurement position can be offered.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] It is a compound [which is characterized by each of said body fat measurement section, said pulse wave measurement section, and said electrocardio measurement section having an electrode used as communication opening of an electrical signal which flows to a living body] healthy [are the compound healthy metering device equipped with the body fat measurement section, the pulse wave measurement section, and the electrocardio measurement section, and] metering device.
[Claim 2] It is the compound healthy metering device according to claim 1 which is equipped with the somatometry section of further others and is characterized by the somatometry section besides the above having an electrode used as communication opening of an electrical signal which flows to a living body.

[Claim 3] Said some of electrodes [at least] are compound healthy metering devices given in any 1 term of claims 1 or 2 characterized by being mutually used in common in a part of [at least] measurement sections.
[Claim 4] Said pulse wave measurement section is a compound healthy metering device given in claim 1 characterized by detecting volume change of the blood by the pulse wave in a blood vessel as impedance change thru/or any 1 term of 3.
[Claim 5] Said electrode is a compound healthy metering device given in claim 1 characterized by being arranged in the measurement section for hands it is supposed that it is at least as a test section about the detecting element for guide pegs and hand it is supposed that it is at least as a test section about a guide peg thru/or any 1 term of 4.
[Claim 6] The compound healthy metering device according to claim 5 characterized by having the change means whose connection changes said some of electrodes [at least] arranged by said detecting element for guide pegs, and said some of electrodes [at least] arranged in said measurement section for hands, and is enabled.
[Claim 7] Said all electrodes are compound healthy metering devices given in claim 1 characterized by being arranged by the detecting element for guide pegs it is supposed that it is at least as a test section about a guide peg thru/or any 1 term of 4.
[Claim 8] Said detecting element for guide pegs is a compound healthy metering device given in any 1 term of claims 5, 6, and 7 characterized by for the scale carrying and being prepared in the base.
[Claim 9] Said electrocardio measurement section is a compound healthy metering device given in claim 1 characterized by having a signal separation filter for carrying out separation clearance of the signal resulting from other measurement sections thru/or any 1 term of 8.
[Claim 10] It is a compound healthy metering device given in claim 1 characterized by having a blood-pressure calculation means for computing a blood-pressure value, and for said blood-pressure calculation means **(ing) height by the pulse wave propagation time, asking for pulse wave velocity, and computing a blood-pressure value according to a predetermined type from said pulse wave velocity thru/or any 1 term of 9.

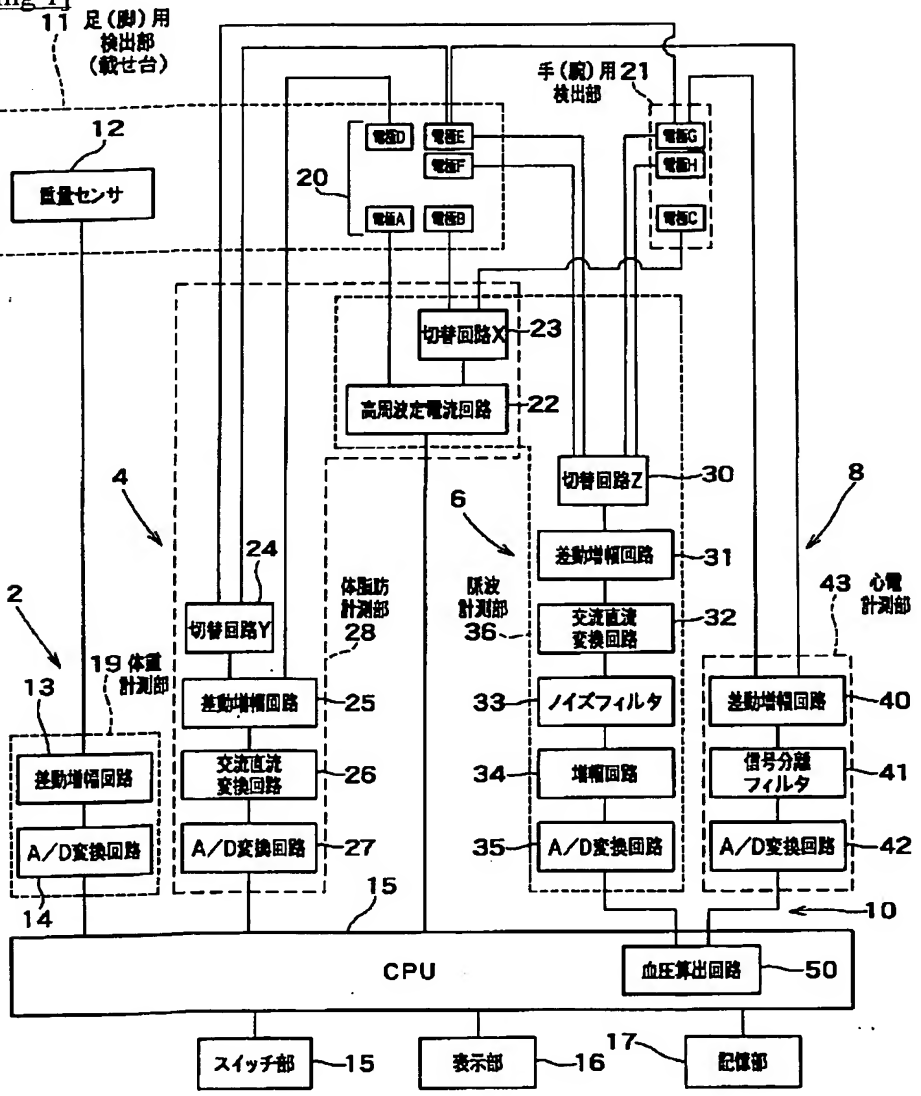
[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]



- [Translation done.]